

# TAXONOMY OF *DIGITARIA* SECTION *AEQUIGLUMAE* (POACEAE: PANICEAE)

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## ABSTRACT

Twelve species are recognized in a taxonomic revision of *Digitaria* section *Aequiglumae*. The DELTA computer system was used in the collection, analysis, and presentation of taxonomic data. A comprehensive set of data was gathered from herbarium specimens and analyzed in order to produce a description of the section, key to the species, and comparative species descriptions. Given with each species is a complete set of specimen citations and discussion of diagnostic characters and taxonomic relationships. Recognized species include *D. aequiglumis*, *D. connivens*, *D. costaricensis*, *D. caryabensis*, *D. ekmanii*, *D. eriostachya*, *D. lanuginosa*, *D. leucites*, *D. paniciflora*, *D. sabulicola*, *D. simpsonii*, and *D. texana*.

## INTRODUCTION

*Digitaria* Haller consists of approximately 240 species, occurs in temperate and tropical regions of the world, and is commonly recognized as one of the most taxonomically difficult genera of the Paniceae R. Br. This difficulty is a result of the relatively large number of taxa, wide geographical distribution, wide range and complexity of the significant taxonomic characters, and a general lack of knowledge concerning the morphological relationship among the taxa. *Digitaria* is usually easy to separate from other genera of the Paniceae; however, rarely specimens may be encountered which can be confused with *Panicum* L. To distinguish these genera one has to ultimately determine whether the margins of the upper lemma are inrolled or flat, and this can sometimes be a difficult or subjective decision. Diagnostic characters of *Digitaria* include the following: ligule a membrane or ciliate membrane, primary inflorescence branch with secund spikelets, branches of inflorescence terminating in a spikelet,

spikelets abaxial, and lemma of upper floret with flat, thin-textured margins (Webster 1988, Webster and Valdes 1988). Possible close relatives include *Panicum*, *Anthaenantia* P. Beauv., and *Homolepis* Chase; however, detailed quantitative studies of the character distribution for all genera of the Paniceae are required before definitive statements are possible concerning generic relationships. Until that time, all statements concerning proposed relationships among these genera provide only a limited service to the biological community.

Henrard's (1950) monograph of *Digitaria*, though 40 years out-of-date, continues to serve as the starting reference for all serious studies in the genus. That study recognized approximately 325 species and grouped these into the following four subgenera; *Eu-Digitaria* Stapf, *Leptoloma* Chase, *Setariopsis* Stapf, and *Solitaria* Hack. Approximately 306 of the species were placed in the 32 recognized sections of subgenus *Digitaria* (= *Eu-Digitaria* Stapf). The section *Aequiglumae* Henrard (described on page 641 of his monograph) was defined primarily on the basis of the second glume being equal in length to the lower lemma and upper floret. Other significant characteristics include paired spikelets and the typical absence of the first glume. Agrasar (1974) and Webster (1983) provide more detailed and comparative descriptive data for this section. Henrard's monograph recognized the following taxa, all native to the New World, as comprising the *Aequiglumae*: *D. aequiglumis* (Hack. & Arech.) L. Parodi, *D. albicoma* Swallen, *D. campestris* Henrard, *D. connivens* (Trin.) Henrard, *D. cuyabensis* (Trin.) L. Parodi, *D. distans* (Chase) Fern., *D. ekmanii* Hitchc., *D. eriostachya* Mez, *D. laetevirens* Mez, *D. lanuginosa* (Nees) Henrard, *D. leucites* (Trin.) Henrard, *D. malacophylla* (Hitchc.) Henrard, *D. pauciflora* Hitchc., *D. runyonii* Hitchc., *D. sabulicola* Henrard, *D. simpsoni* (Vasey) Fern., *D. subcalva* Hitchc., and *D. texana* Hitchc. Since that time, one new species, *D. costaricensis* Pohl, has been named to this section.

The formal taxonomic history of the species in this section began in the early 1800's with the work of Trinius, Nees, and Arechavaleta. These authors named five species and placed them in *Panicum* or *Paspalum*. The first North American taxon was recognized by Vasey in 1892, who described it under *Panicum*. In the early 1900's Chase named three taxa and placed them in *Syntherisma* Walter. During this period, Mez named two new species and was the first taxonomist to place a member of the section in *Digitaria*. This generic concept was followed by Parodi who described one new species and made two new combinations in the section. Between 1913 and 1934, Hitchcock contributed nine new combinations or new species in the section. The first three of these, those prior to 1926, were described in

*Syntherisma* and the subsequent ones in *Digitaria*. From 1930 to 1950 Henrard provided ten names and formally recognized the section.

As with most other sections of *Digitaria* there has been little significant research to clarify taxonomic relationships among taxa of the *Aequiglumae*. A cursory analysis of some taxa related to *D. leucites* is given in Boonbundarl (1985), but undoubtedly the most meaningful recent revision is Agrasar's (1974) treatment of the Argentine *Digitarias*. It is not surprising that frequently the best sources of new taxonomic data are regional floristic treatments, however, these have the obvious shortcoming of being limited in aspects of geography and data collected. Floristic treatments of grasses of direct significance to the present study include: Hitchcock's (1927, 1936, & 1951) treatments for Ecuador, Peru, Bolivia, the West Indies, and the United States; Smith, Wasshausen, and Klein's (1982) treatment for Santa Catarina; Rosengurtt's (1970) treatment for grasses of Uruguay; and McVaugh's (1983) treatment for Nueva Galicia.

The objective of this research was to clarify the taxonomic relationships among taxa of the *Aequiglumae*. To accomplish this goal, available herbarium specimens were studied and used to collect a comprehensive set of morphological and geographical data. The specific characters recorded for the recognized taxa are listed on microfiche in Webster et al. (1989). In addition to these characters, an anatomical examination of the leaf blade epidermis for all recognized taxa was made. Data for the following characters were recorded: (1) average number of rows of stomates in the intercostal zones, (2) average stomate length, (3) average stomate width, (4) average number of rows of long cells in the intercostal zones, (5) average long cell width, (6) average long cell length, (7) average width of the intercostal zones, (8) relative abundance of prickles, and (9) the shape of the apex of the distal cell of the bicellar microhairs. Selection of these characters which we feel to be important was based on previous anatomical studies of species of *Digitaria* by Webster (1983). Results from these anatomical studies on taxa of the *Aequiglumae* indicated that the average values for certain characters could be used to separate some taxa. However, the range of variation within each taxon was great enough to prevent these characters from being useful or reliable for identification. Therefore, the anatomical data is not presented here. An interesting unifying anatomical feature of the members of this section is the presence of a bulbous swelling at the apex of the microhair distal cell. All members possessed this unique character, although it was not well-developed in *D. pauciflora*. Presence of this feature in all members of this section and its absence from other species of the genus support a monophyletic interpretation for this section.

The morphological and geographical data were stored in DELTA format (Dallwitz 1974 & 1980) and used in the production of a key and descriptions. Data for 285 characters (see the microfiche in Webster et al. 1989) were recorded for each of the recognized taxa. INTKEY (the information retrieval program in Dallwitz's DELTA system) was used to combine the taxonomically significant characters for the section into one description. In the following description of the *Aequiglumae*, each character state is accompanied by a number or fraction indicating the distribution of data for the species. For example, "Plants annual (1) or perennial (11)", indicates that one of the twelve recognized species is annual and eleven are perennial. The fraction 1/9 indicates that the character was coded for 9 taxa and 1 possessed the character state. This is followed by a key produced via CONFOR and KEY, which represents an efficient use of characters and placement of taxa for the practical identification of the species. Our concepts of the reliability of the characters are incorporated in the key. Descriptions of the recognized species includes a subset of characters of diagnostic value for the section. General methods used with this technology are adequately described elsewhere, but we consider it important to make the following general statement. Application of DELTA computer technology serves as an efficient means of collecting, analyzing, presenting, and storing taxonomic data. It also allows for quick experimentation with the production of descriptions, keys, and database interrogation for various taxonomic purposes. However, those parameters that ultimately determine the value or usefulness of taxonomic research (i.e., development of character concepts and taxon concepts and the detailed, precise, and comparative collection of data) are and must be the responsibility of the taxonomist and not the methods applied — whether computerized or not.

#### TAXONOMIC TREATMENT

DIGITARIA SECTION AEQUIGLUMAE Henrard, Monograph of the genus *Digitaria* 641. 1950. — TYPE SPECIES: *D. aequiglumis* (Hackel & Arechav.) L. Parodi.

*Description:* Plants annual (1) or perennial (11). Main axis present or absent (2). Primary branches with appressed secondary branches; not winged; with neatly arranged spikelets. Pedicels truncate (8) or cupuliform at the apex (5). Cleistogamous inflorescence present (2) or absent (10). Cleistogamous spikelets similar to the chasmogamous spikelets (2/2). Spikelets paired; densely (3) or slightly overlapping (11); evenly distributed on the rachis or becoming more concentrated at the rachis apex (1). First glume present (2) or absent (11). Rachilla not pronounced below the second glume. Second glume present; 0.9–1.0 times spikelet length. Lower

floret lacking stamens. Lemma of lower floret with equal internerve spacing (7) or with the first internerve space wider than the second (8); the nerves pronounced but not swollen; lacking distinct transverse nerves; glabrous (7) or hairy (9). Lower lemma hairs not forming a distinct horizontal line (9/9); overtopping (1/9) or subequal to the upper floret (8/9); smooth and terete (1/9) or flattened and coiled (8/9); without apical modifications (9/9). Palea of lower floret vestigial (3) or absent (10). Upper floret 0.7–1.05 times the length of the lower floret. Lemma of upper floret smooth; grey (8), or yellow (7), or purple (3).

*Remarks:* This study recognized twelve taxa in *Digitaria* section *Aequiglumae*. All are native to the New World with one species, *D. aequiglumis*, introduced into the Old World. Significant diagnostic characteristics of this section include the following; most are perennial, the primary branches are not winged, the first glume is typically absent, length of the second glume equals spikelet length, the lower floret lacks a well-developed palea, and when hairs are present on the spikelet parts they are simple, smooth, and unmodified. Additional interesting characters of the section include the presence of cleistogamous inflorescences in two species and the presence of both cupiliform and truncate pedicel apices. Typically, members of a section within *Digitaria* will be consistent for the latter character.

*Recognized taxa:* *D. aequiglumis* (Hackel & Arechav.) L. Parodi, *D. con-nivens* (Trin.) Henr., *D. costaricensis* Pohl, *D. curyabensis* (Trin.) L. Parodi, *D. ekmanii* Hitchc., *D. eriostachya* Mez, *D. lanuginosa* (Nees) Henr., *D. leucites* (Trin.) Henr., *Digitaria pauciflora* Hitchc., *D. sabulicola* Henr., *D. simpsonii* (Vasey) Fern., *D. texana* Hitchc.

#### KEY TO THE SPECIES OF *DIGITARIA* SECTION *AEQUIGULMAE*

- |       |  |                       |
|-------|--|-----------------------|
| 1(0). | Cleistogamous inflorescence present in the axil of the uppermost leaf                              | 2                     |
|       | Cleistogamous inflorescence absent   | 3                     |
| 2(1). | Upper floret 0.7–0.87 times the length of the lower floret; plants annual; plants lacking rhizomes | <i>D. aequiglumis</i> |
|       | Upper floret 0.88–1.0 times the length of the lower floret; plants perennial; plants rhizomatous   | <i>D. lanuginosa</i>  |
| 3(1). | Spikelets less than 3.3 mm long  | 4                     |
|       | Spikelets 3.3–5.0 mm long  | 12                    |
| 4(3). | Spikelets 0.4–0.5 mm wide  | <i>D. sabulicola</i>  |
|       | Spikelets more than 0.5 mm wide  | 5                     |
| 5(4). | Spikelets 0.51–0.89 mm wide  | 6                     |
|       | Spikelets greater than 0.89 mm wide  | 11                    |
| 6(5). | Second glume 7-nerved; first glume frequently present  | 7                     |
|       | Second glume 5-nerved; first glume absent  | 8                     |
| 7(6). | Leaf blades filiform; leaf blades about 2 mm wide and purple in color; culms wiry                  | <i>D. pauciflora</i>  |

- Leaf blades linear; leaf blades typically 3–4 mm wide and green in color; culms not wiry . . . . . *D. simpsonii*
- 8(6). Primary inflorescence branches 0.2–0.3 mm wide . . . . . 9  
 Primary inflorescence branches greater than 0.3 mm wide . . . . . 10
- 9(8). Leaf blades glabrous; leaf blades with the midrib not obviously differentiated; South America . . . . . *D. eriostachya*  
 Leaf blades hairy; leaf blades with the midrib obviously differentiated; Caribbean . . . . . *D. ekmanii*
- 10(8). Leaf blades with the midrib obviously differentiated; spikelets usually densely hairy, with the hairs turning purple early; peduncle usually more than 10 cm long; mainly Texas . . . . . *D. texana*  
 Leaf blades with the midrib not obviously differentiated; spikelets sparsely hairy, the hairs white and occasionally turning purple; peduncle usually less than 10 cm long; mainly South America . . . . . *D. cuyabensis*
- 11(5). Lemma of lower floret glabrous; second glume 7-nerved; spikelets lanceolate; Florida . . . . . *D. simpsonii*  
 Lemma of lower floret hairy; second glume 5-nerved; spikelets elliptic; Mexico . . . . . *D. leucites*
- 12(3). Mid-culm leaf blades not reflexed; spikelets hairy; leaves hairy; Mesoamerica . . . . . *D. costaricensis*  
 Mid-culm leaf blades reflexed; spikelets glabrous; leaves glabrous; South America . . . . . *D. connivens*

*DIGITARIA AEQUIGLUMIS* (Hack. & Arech.) L. Parodi, Revista Fac. Agron.

Veterin., Buenos Aires 4:47. 1922. *Syntherisma aequiglumis* (Hack. & Arech.) Hitchc., Contr. U.S. Natl. Herb. 7:211. 1913. *Panicum debile* Desf. var. *aequiglume* (Hack. & Arech.) Hack., in Stuekert, Anales Mus. Nac. Hist. Nat. Buenos Aires 11:69. 1904. *Panicum aequiglume* Hack. & Arech., Gram. Urug. 93. 1894. — TYPE: URUGUAY, Montevideo, 3–1885, *Arechavaleta* 220 (HOLOTYPE: W; ISOTYPE: US!).

*Panicum ramosum* Arech., Anales Mus. Nac. Montevideo 1:111. 1894. *Digitaria campestris* Henr., Blumea 1:97. 1934. — TYPE: URUGUAY, *Arechavaleta* (HOLOTYPE: W).

*Panicum tridactylum* Phil., Anales Univ. Chile 93:712. 1896. — TYPE: CHILE, Curico, (HOLOTYPE: W, # 40680).

*Digitaria chillanensis* Phil. ex Henr. Monogr. *Digitaria* 29. 1950. — TYPE: CHILE, (HOLOTYPE: W).

*Digitaria laetevirens* Mez, Bot. Jahrb. Syst. 56:8. 1921. *Digitaria aequiglumis* var. *laetevirens* (Mez) Henr., Monogr. *Digitaria* 370. 1950. — TYPE: Evidently destroyed.

*Description:* Plants annual; stoloniferous; lacking rhizomes (rarely with poorly developed compacted rhizomes). Nodes glabrous (rarely sparsely pilose). Auricles 1–2 mm long. Sheaths glabrous or hairy. Ligule 1.2–2.2 mm  $\frac{1}{4}$  long. Leaf blades flexuous; spreading; mostly 2–12 cm long; 2–6 mm wide; usually glabrous on the lower surface; glabrous or

hairy on the upper surface; with the midrib not obviously differentiated. Main axis 5–30 mm long; with quaquaversal primary branches. Primary branches appressed to spreading from the main axis; whorled only at the lower nodes; (2–)3–6(–8) on the main axis; 0.3–0.5 mm wide. Pedicels 2–3.5 mm long. Cleistogamous inflorescence present. Spikelets 26–42 on a typical primary branch; lanceolate; (3–)3.2–4.2 mm long; 0.6–0.8 mm wide. First glume absent. Second glume 1 times spikelet length; 5 or 7-nerved; glabrous or hairy; acuminate. Lemma of lower floret 7-nerved; acuminate; glabrous or hairy. Lower lemma hairs shorter than the upper floret; white. Upper floret 0.7–0.87 times the length of the lower floret. Lemma of upper floret grey (yellow when immature); acuminate.

*Distribution:* Brazil, Paraguay, Uruguay, Chile, and Argentina.

*Remarks:* *Digitaria aequiglumis* is the only representative of this section known to occur in the Old World, in that it has been introduced in Europe and naturalized in a few localities in southern Australia. This species, as treated here, is relatively easily to recognize; however, previous authors have placed some specimens under *D. lanuginosa* and *D. cuyabensis*. Usually it can be recognized at a glance by the presence of a relatively high degree of branching, dark-colored nodes, and yellow-green leaves. Taxonomically significant spikelet characters include the relatively long acuminate second glume and lower lemma which overtop the upper floret by 0.5–1.0 mm. Presence of the cleistogamous inflorescence in the upper leaf sheath was positively correlated with the other primary characters used to define this species. As far as we are aware, this is the only species of this genus where this feature serves as a significant character for differentiating a species. This species lacks rhizomes and well-developed stolons and was therefore described as an annual, but it is believed that plants survive for more than one year.

Henrard (1950) differentiated *D. campestris* from *D. aequiglumis* based primarily on variation in pubescence of the nodes and leaves. Our studies of specimens in this section have shown that such variation cannot be correlated with important diagnostic characters and since there were no other differentiating characters we are treating *D. campestris* as a synonym. *Digitaria laetevirens* Mez appears to be identical to *D. aequiglumis* except for the complete absence of hairs on the second glume and lower lemma. This pattern of pubescence, where there exists essentially identical glabrous and hairy forms, is not uncommon in *Digitaria*. Henrard frequently gave formal taxonomic rank, usually varietal, to this variation, however, recent revisions by Veldkamp (1973), Webster (1983), and Webster (1987) tended to minimize the taxonomic importance of this character variation.

Representative specimens: ARGENTINA. (locality uncertain) *T. Stueckert* 13862 (US #557989). Buenos Aires: Dock Sur, 8 Apr 1909, *S.I. No.* 12524 (US). Córdoba: *Herbarium Hackel* (US #297953); Bezirk Rio Primero, Villamonte, Jan 1904, *Stueckert* 545 (MO, US); Corrientes: Santa Fé, Villa Ocampo, 20 Jan 1895, *C. Quarin* 1895 (US). Entre Ríos: Paraña: Chaná Mini, *L. Parodi* 4926 (US); Punilla: Orilla NE del Lago San Roque, 29 Feb 1976, *Hunziker* 22925 (NY). Tucumán: Capital, Rio Sali, 16 Dec 1923, *S. Venturi* 2167 (US); Cerro de Campo, 15 Mar 1930, *S. Venturi* 10212 (US). BRAZIL. Brasilia: RGS, Cristal, Porto Alggre, 31 Mar 1949, *B. Rambo* J. 40741 (US). Curitiba, Parque Rio Iguacu, 27 Dec 1979, *R. Kummrow* 1297 (MO, NY). Rio Grande do Sul: Dom Pedrito, 15 Apr 1946, *Swallen* 9102 (US); Santa Victoria do Palmar, 27 Apr 1946, *Swallen* 9207 (US). Santa Catarina: Itajaí, 7 Dec 1972, *R. M. Klein* 10.458 (US). CHILE. Palguin, Nov 1928, *C. Joseph* 4846 (US); Santos de Chillan, (US #1126084). URUGUAY. Campos del Uruguay (locality unknown) *J. Arechavaleta s.n.* (US #927949, #927950, #927951, #927952). *Hackel* 30 (US #927958). Cerro Largo: Dec 1935, *B. Rosengurt* 1049 (US). Durazno: Estancia Las Palmas, 1926, *Osten* 18743 (US); San Gregorio, La Paloma, *Osten* 19536 (US). Canelones: Arroyo Sarandi sobre el río de la Plata, Costa Azul, 26 Feb 1956, *B. Rosengurt* B-6524½ (F). Flores: río fi y Arroyo Marindro, 10 Apr 1937, *B. Rosengurt* B-1508b (US). Florida: Campo experimenta de Pastos, Estancia Rincon de Santa Elena, 23 Feb 1948, *B. Rosengurt* 5960 (F, US); Mausavillagra, 31 Dec 1936, *B. Rosengurt* B- 850 (US). Montevideo: 1 Apr 1888, *Arechavaleta* (US #927960). Rocha: Laguna Negra, 20 Mar 1938, *B. Rosengurt* B-2615½ (US). Soriano: Monzón-Heber, Juan Jackson, 1 May 1940, *B. Rosengurt* PE-4385 (F, US, NY).

*DIGITARIA CONNIVENS* (Trin.) Henr., *Meded. Rijks-Herb.* 61:6. 1930.  
*Panicum connivens* Trin., *Mém. Acad. Imp. Sci. St. Petersburg* 6(3):206.  
1834. — TYPE: BRAZIL (HOLOTYPE: LE; ISOTYPE: P, W).

*Description:* Plants perennial; stoloniferous; lacking rhizomes. Nodes glabrous. Sheath auricles 0.5–1.5 mm long. Sheaths glabrous. Ligule 1.5–3 mm long. Leaf blades straight to flexuous; reflexed; 2–5 cm long; 1–6 mm wide; glabrous on the lower surface; glabrous on the upper surface; with the midrib not obviously differentiated. Main axis 3–15 mm long; with quaquaversal primary branches. Primary branches appressed to the main axis; not whorled; 2–4 on the main axis; 0.4–0.5 mm wide. Pedicels 2–6 mm long. Cleistogamous inflorescence absent. Spikelets 16–34 on a typical primary branch; lanceolate (approaching elliptic); 3.3–5 mm long; 0.9–1.2 mm wide. First glume mostly absent (occasionally present as a vestigial scale ca. 0.2 mm long). Second glume 1 times spikelet length; 7(-9)-nerved; glabrous; acuminate. Lemma of lower floret 7-nerved; acuminate; glabrous. Upper floret 0.94–1 times the length of the lower floret. Lemma of upper floret grey or yellow; acuminate.

*Distribution:* Southeast Brazil.

*Remarks:* *Digitaria connivens* occurs in southern coastal regions of Brazil, where it is commonly associated with coastal sand dunes. Important diagnostic characteristics possessed by this easily recognizable species in-



clude the relatively short, reflexed, and obviously distichous leaf blades; an inflorescence consisting of only a few primary branches appressed to the central axis; relatively large and completely glabrous spikelets; and a caryopsis which completely fills the interior of the upper floret.

Representative specimens: **BRAZIL**. (location and collection date uncertain), *Schott 4844* (US). Paraña: Caiobá, Praia do Mendanha, June-1-1961, *R. Braga 1627* (US). Rio de Janeiro: Rio de Janeiro, collection date unknown, *Luschnath s.n.* (US). Rio Grande do Sul: Sacco du Mangeira, 1902, *G. O. Mealmé 1561* (US); Brasília, Torres, 11 Feb 1954, *B. Rambo S. J. 54777* (US); Rio Grande, 3 May 1946, *J. R. Swallen 9241* (US); Camaqua, Fazenda Aguada, Lagoa dos Patos, 12 May 1946, *J. R. Swallen 9287* (US). Santa Catarina: Jurerê, 15 Feb 1966 *Klein, Souza S. & Bresolin 6.657* (US); *Voyage A. St. Hilaire 1711*, 1816-1821, (US). São Paulo: Mun. Cananeia, Ilha Comprida, 16 Feb 1965, *W. D. Clayton & G. Eiten 4688* (US); Mun. Cananeia, Ilha Comprida, 16 Feb 1965, *W. D. Clayton & G. Eiten 4710* (US); Mun. Iguape, East point of Iguape Island, 19 Feb 1965, *W. D. Clayton & G. Eiten 4761* (US); Santos, Guarujá, 23 Feb 1938, *F. C. Hoehne 39261* (US).

**DIGITARIA COSTARICENSIS** Pohl, *Fieldiana, Bot.* 38:5. 1976. — TYPE: COSTA RICA, Prov. Cartago, 10-8-1986, *Pohl & Davidse 11215* (HOLOTYPE: ISC!).

*Description*: Plants perennial; stoloniferous; with poorly developed rhizomes. Nodes hairy. Sheath auricles about 1.5 mm long. Sheaths hairy. Ligule 1-2 mm long. Leaf blades flexuous; spreading; 4-15 cm long; 3-7 mm wide; hairy on the lower surface; hairy on the upper surface; with the midrib not obviously differentiated. Main axis 10-20 mm long; with quaquaversal primary branches. Primary branches appressed to the main axis; not whorled; 3-6 on the main axis; 0.3-0.4 mm wide. Pedicels 2-4 mm long. Spikelets 18-50 on a typical primary branch; lanceolate; 3.3-4.1 mm long; 0.85-1 mm wide. First glume absent (or present as a hyaline scale to 0.3 mm long). Second glume 1 times spikelet length; 7-nerved; hairy; acuminate to acute. Lemma of lower floret 7-nerved; acuminate to acute; hairy. Lower lemma hairs shorter than the upper floret; white. Upper floret 0.95-1 times the length of the lower floret. Lemma of upper floret yellow; acuminate to acute.

*Distribution*: Costa Rica.

*Remarks*: Pohl (1980) correctly placed this species in the *Aequiglumae* on the basis of the relative sizes of the spikelet parts. In addition, he indicated that it seemed to be most similar to *D. aequiglumae* but differed on the leaf pubescence, leaf width, presence of a first glume, and the number of nerves on the second glume and lower lemma. Even though there are only three known collections, it is obvious that they represent a distinct taxon. The pattern and type of leaf pubescence is similar to the hairy form of *D. cryabensis*. The spikelets are relatively large with pronounced nerves and scattered fine hairs on the second glume and lower lemma.

Representative specimens: COSTA RICA. Providence Cartago: Rio Macho Reservoir, S of Orosí, 3 Oct 1968, *Pobl & Davids* 11190 (ISC); 25 km SW of Tejar along the Carretera Interamericana, 8 Oct 1968, *Pobl & Davids* 11215 (ISC); 2 km W of Paraiso, 21 Apr 1969, *Pobl & Davids* 17789 (ISC).

*DIGITARIA CUYABENSIS* (Trin.) L. Parodi, *Physis* 8:378. 1926. — *Digitaria lanuginosa* (Nees) Hent. var. *cuyabensis* (Trin.) Hent., *Monogr. Digitaria* 164–165. 1950. *Syntherisma cuyabensis* (Trin.) Hitchc., *Contr. U.S. Natl. Herb.* 22:468. 1922. *Panicum cuyabense* Trin., *Mém. Acad. Imp. Sci. St. Petersburg* 3:206. 1834. — TYPE: Trinius Herbarium (HOLOTYPE: LE).

*Syntherisma malacophylla* Hitchc., *Contr. U.S. Natl. Herb.* 22:466. 1922. *Digitaria malacophylla* (Hitchc.) Hent., *Meded. Rijks-Herb.* 61:4. 1930. — TYPE: BRITISH GUIANA, 31 Dec 1919, *Hitchcock* 17284 (HOLOTYPE: US!).

*Description:* Plants perennial; stoloniferous (frequently not pronounced); rhizomatous. Nodes glabrous or hairy (the upper nodes usually glabrous). Sheath auricles 0.8–1.5 mm long. Sheaths glabrous or hairy. Ligule 1–2 mm long. Leaf blades straight; spreading; 2.5–20 cm long; 3–6(-8) mm wide; glabrous or hairy on the lower surface; glabrous or hairy on the upper surface; with the midrib not obviously differentiated. Main axis 5–40 mm long; with quaquaversal primary branches. Primary branches appressed to the main axis to spreading; usually whorled at the lowermost node; 3–8 on the main axis; 0.31–0.4 mm wide. Pedicels 1.5–2.5 mm long. Spikelets 30–60 on a typical primary branch; lanceolate to elliptic; 2.4–3 mm long (-3.5); 0.6–0.75 mm wide. First glume absent (or present as a minute hyaline scale 0.1–0.2 mm long). Second glume 1 times spikelet length; 3 to 5-nerved; hairy (rarely glabrous); acuminate to acute. Lemma of lower floret 7-nerved; acuminate to acute; glabrous or hairy. Lower lemma hairs shorter than the upper floret; white or purple. Upper floret 0.95–1.05 times the length of the lower floret. Lemma of upper floret grey; acuminate to acute.

*Distribution:* South America (Guiana, Surinam or French Guiana, Brazil, Paraguay, Uruguay, and Argentina) and Central America.

*Remarks:* *Digitaria cuyabensis* occurs in Argentina, Paraguay, Uruguay, Brazil, and extends up the east coast of South America to Central America. It has been frequently confused with *D. aequiglumis*; however, these species, as defined here, are clearly distinct. *Digitaria cuyabensis* is an obvious perennial, spikelets are usually less than 3.1 mm long and less than 0.8 mm wide, and the leaf blades and spikelet bracts are usually hairy. The complete absence of a cleistogamous inflorescence and relative length of the florets are the most important diagnostic characters for distinguishing between these species.

Hitchcock (1922) originally described *D. malacophylla* in the genus *Syn-*

*therisma* and differentiated it from *D. cuyabensis* on the basis of leaf pubescence and the spreading nature of the primary inflorescence branches. His concept of the species was based only on the type specimen. Henrard (1950) transferred it to *Digitaria* and separated it from *D. lanuginosa*, which included the variety *cuyabensis*, based on a shorter spikelet length and its proposed annual nature. Our studies indicate that typical specimens of *D. cuyabensis* vary in the amount of leaf hairs from glabrous to densely hairy. Generally, specimens from northern part of South America, specifically from the Brazilian state of Pernambuco, are hairy and those from southern parts tend to be glabrous; however, there are numerous obvious exceptions. The primary branches of the inflorescence are spreading at maturity in both forms. In addition, other specimens referable to *D. malacophylla* show its perennial nature and spikelet lengths intergrade between the two forms. Therefore, it was concluded that *D. malacophylla* is best treated as a synonym of *D. cuyabensis*.

Most of the specimens in the *D. aequiglumis* complex fit well within the classification system proposed in this paper; however, a few specimens [Steinbach 6877 (US), Parodi 8323 (US), and Parodi 9259 (US) from Argentina; Gines s.n. from Venezuela; Hitchcock 8245 from Panama] were morphologically intermediate. These specimens are perennials and lack a cleistogamous inflorescence; the spikelets are about 2.8 mm long, acuminate, with an overtopping second glume and lower lemma. Therefore, they do not fit well into the concepts of *D. aequiglumis*, *D. lanuginosa*, *D. cuyabensis*. It was concluded that these specimens do not represent a new taxon but are the products of hybridization and introgression within this complex. They were annotated as intermediates.

Representative specimens: ARGENTINA. Buenos Aires: Puerto Nuevo, 15 Apr 1928, L. R. Parodi 8524. Corrientes: Parada Puchera, Ruta Nac. No. 127, 17 Feb 1979, O. Abumada 2551 (MO). Formosa: (location not given), Jan 1918, Jørgensen 2434 (US); (location not given), Jan 1928, L. R. Parodi 8338 (US); (location not given), 23 Jan 1928, L. R. Parodi 8326 (US). BRAZIL. Ceará: Campo Grande, 12 May 1934, J.R. Swallen 4533 (US). Mato Grosso: Mun. de Caceres, Faz. Descalvados, 4 Nov 1978, A. Allen et al 2386 (MO); between Campo Grande and Dourados, 14 Feb 1930, Chase 10923 (US); between Campo Grande and Dourados, 14 Feb 1930, Chase 10923 + (US). Minas Geraes: Serra de San Antonio, Diamantina, 27 Dec 1929, Chase 10328 (US); Serra de San Antonio, Diamantina, 27 Dec 1929, Chase 10417 (US). Pernambuco: Recife, 12 Nov 1924, Chase 7670 (US); Recife, 20 Nov 1924, Chase 7763 (US); Tapéra, Feb 1929, B. Pickel 1968 (US); Tapéra, Jan 1930, B. Pickel 2241 (US); Tapéra, 4 Dec 1932, B. Pickel 3171 (US); Tapéra, 9 Jan 1935, B. Pickel 3769 (US); Tapéra, 30 May 1935, B. Pickel 3794 (US). Rio Grande do Norte: Estremoz to Natal, 1 Jun 1934, J. R. Swallen 4788 (US). GUYANA. North Guiana, Rockstone, 13 Jul 1921, H. A. Gleason 636 (US); Rockstone, 31 Dec 1919, Hitchcock 17284 (US); (location unknown), 1838, Leprieur s.n. (US). PARAGUAY. Central: Asunción, Banco San Miguel, Rio Paraguarí, Jan 1949, Rosengurt 5442 (US); Bord

sablonneux du Rio Par guay, Feb 1877, *B. Balansa* 147 (US); Loma Par , (Chaco), 15 May 1917, *T. Rojas* 2668 (US); Pilcomayo River, May 1906, *T. Rojas* 92 (US); Pilcomayo River, 1888 – 1890, *T. Morong* 962 (US); Puerto Casado, Jan 1917, *T. Rojas* 2723 (US); Puerto Colon, May 1943, *T. Rojas* 10525 (US); Regione lacus Ypacaray, Jan 1913, *E. Hassler* 12464 (US); Ypacaray, (collection date unknown) *E. Hassler* 13018 (US). PANAMA. Chirinqui: between El Hato and Cerro Punta, 4 Aug 1960, *E. Ebinger* 765 (US); vicinity of El Boquete, 7 Oct 1911, *Hitchcock* 8262 (US).

*DIGITARIA EKMANII* Hitchc., U.S.D.A. Misc. Publ. 243:176.

1936. — TYPE: CUBA, Pinar del Rio, Herradura, 26 Jun 1922, *Ekman* (HOLOTYPE: US!; ISOTYPE: MO!).

*Digitaria ekmanii* Hitchc. var. *curtissii* Henr., Monogr. *Digitaria* 213. 1950. — TYPE: CUBA, Isla de Pinos, 1 Jun 1904, *Curtiss* 521 (HOLOTYPE: HAC; ISOTYPES: FI, NY!, US!)

*Description:* Plants perennial; lacking stolons; rhizomatous. Nodes glabrous or hairy. Sheath auricles 0.5 – 2.5 mm long. Sheaths glabrous or hairy. Ligule 1.5 – 2.5 mm long. Leaf blades flexuous; spreading; 5 – 22 cm long; 3 – 6 mm wide; hairy on the lower surface; hairy on the upper surface; with the midrib obviously differentiated (on the lower surface). Main axis mostly 15 – 40(–60) mm long; with quaquaversal primary branches. Primary branches appressed or spreading from the main axis; not whorled; 4 – 9 on the main axis; 0.2 – 0.3 mm wide. Pedicels about 2.2 mm long (with relatively long narrow lateral pedicels). Spikelets 40 – 120 on a typical primary branch; oblong or elliptic; 2.2 – 2.5 mm long; 0.6 – 0.7 mm wide. First glume always completely absent. Second glume 1 times spikelet length; 3 to 5-nerved; glabrous or hairy; acute. Lemma of lower floret 7-nerved; acute; glabrous or hairy. Lower lemma hairs shorter than the upper floret; silvery. Upper floret 1 times the length of the lower floret. Lemma of upper floret yellow (soon becoming purple); acuminate to acute.

*Distribution:* Cuba.

*Remarks:* *Digitaria ekmanii* is currently known only from Cuba, however, we feel that future collections will likely show that it occurs elsewhere in the Caribbean. Spikelets of this species, specifically on the lower lemma and second glume, may be either glabrous or hairy. As with other species of *Digitaria* especially in this section, little or no taxonomic significance can be applied to this variation since it does not correlate with other characteristics. Specimens with glabrous spikelets (e.g. *E. L. Ekman* 1052 & 14086) are otherwise essentially identical to those with a fine line of white villous hairs in the internerve spaces (e.g. *E. L. Ekman* 10938 & 11310) varies relative to the density of the hairs. Additional important characteristics of this species include the presence of a pronounced raised

midnerve on the lower surface of the leaf blades, relatively long and filiform pedicels, and the complete absence of the lower glume. Finally, the spikelets are narrowly ovate to elliptic or nearly oblong.

Representative specimens: CUBA. Isla de Pinos, Apr 1904, *A. H. Curtis s.n.* (NY); Isla de Pinos, Nueva Gerona, 1 Jun 1904, *A. H. Curtis 521* (F MO, NY, US); Isla de Pinos, Santa Bárbara, 2 Nov 1920, *E. L. Ekman 12021* (F NY). Pinar del Rio: Herradura, 26 Jun 1922, *E. L. Ekman 1052* (MO, NY, US); Herradura, 21 Jun 1922, *E. L. Ekman 14086* (NY); Arroyo Nantua, Damuje, 27 May 1920, *E. L. Ekman 10938* (F NY); between Remates and La Fé, 17 Jun 1920, *E. L. Ekman 11310* (F NY, US). Santa Clara: Sabanas des Manaca, near Asiento Viejo, 25 Jul 1920, *Bro. León 9294* (NY).

*DIGITARIA ERIOSTACHYA* Mez, Bot. Jahrb. Syst. 56, Beibl. 125(4):80. 1921. — TYPE: PARAGUAY, *Balansa 146* (HOLOTYPE: L).

*Digitaria fallens* L. Parodi, Revista Soc. Arg. Ciencias Naturales 8:375. 1926. — TYPE: ARGENTINA, *Parodi 7130* (HOLOTYPE: BAA; ISOTYPE: US).

*Description:* Plants perennial; stoloniferous; rhizomatous or lacking rhizomes. Nodes glabrous. Sheath auricles 1–2 mm long. Sheaths glabrous. Ligule 1–3 mm long. Leaf blades flexuous; spreading; 3–20 cm long; 3–8 mm wide; glabrous on the lower surface; glabrous on the upper surface; with the midrib not obviously differentiated. Main axis 20–40 mm long; with quaquaversal primary branches. Primary branches appressed to the main axis to spreading; not whorled; 4–7 on the main axis; 0.2–0.3 mm wide. Pedicels 2–3 mm long. Cleistogamous inflorescence absent. Spikelets 36–60 on a typical primary branch; lanceolate or elliptic; (2.2–)2.4–2.9 mm long; 0.6–0.8 mm wide. First glume absent (occ. present as a minute scale ca. 0.1 mm long). Second glume 1 times spikelet length; 3 to 5-nerved; hairy; acuminate to acute. Lemma of lower floret 7-nerved; acuminate to acute; hairy. Lower lemma hairs overtopping the upper floret (by 0.2–0.5 mm); white. Upper floret 0.92–1 times the length of the lower floret. Lemma of upper floret grey or yellow; acuminate.

*Distribution:* Paraguay and Argentina.

*Remarks:* Presence of long silver hairs, which turn purple at maturity, makes *D. eriostachya* a distinctive easily recognizable species within this section. This hair type, the absence of hairs between the mid-nerve and first lateral nerve, spikelet shape, relatively long slender pedicels, and the presence of secondary branching are features of *D. eriostachya* that indicate a relationship with section *Trichachne*; however, other characteristics of *D. eriostachya* support its retention in the *Aequiglumae*. Additional important diagnostic features of this species include the pronounced long stolons, glabrous leaves, and spikelet length and shape.

Representative specimens: ARGENTINA. Corrientes: Cuay-Grande, 4 Feb 1926, *L. Parodi* 7130 (US); Mburucuyá, "Santa María", 1 Nov 1950, *T. M. Petersen* 835 (US); San Miguel, Loreto, 12 Mar 1972, *C. Quarin* 567 (US); Empedrado, Arroyo Gonzalez y Ruta 12, 27 Feb 1974, *C. Quarin et al.* 2229 (US); Saladas, Estancia Bovril, 13 Dec 1949, *G. J. Schwarz* 9143 (US). Entre Ríos: Federación Santa Ana, 7 Feb 1963, *A. Burkart* 22416 (US). PARAGUAY. Caazapá: Barrento, 14 Mar 1950, *E. Anderson* 1138 (US); Pindafoy, Yuri, Jan 1949, *Rosengurt* 5461 (US). Central: In regione lacus Ypacaray, 1913, *E. Hassler* 11565 (US); Prope Sapucay, (collection date unknown), *E. Hassler* 13018 (US); Trinidad, Asunción, Mar 1942, *T. Rojas* 9476 (US). Misiones: Santiago, 19 Jan 1952, *Rosengurt* B-6117 (US). Neembucu: Yacaré, Pilar, 22 Jan 1949, *Rosengurt* B-5525 (US). Paraguari: Km 98 + ruta Asunción - Encarnación, 16 Jan 1949, *Rosengurt* B-5412 (US).

DIGITARIA LANUGINOSA (Nees) Henr., Meded. Rijks-Herb. 61:5: 1930.  
*Prostium lanuginosum* Nees, Agrost. Bras. 63. 1829. — TYPE: ORIGINALLY AT  
 BERLIN NOW EVIDENTLY DESTROYED.

*Description:* Plants perennial; stoloniferous or lacking stolons; rhizomatous. Nodes hairy (usually pilose). Sheath auricles about 1.5 mm long. Sheaths hairy. Ligule 1.5 – 2.2 mm long. Leaf blades flexuous; spreading; 3 – 12 cm long; 3 – 6 mm wide; usually hairy on the lower surface; usually hairy on the upper surface; with the midrib not obviously differentiated. Main axis 10 – 20 mm long; with quaquaversal primary branches. Primary branches appressed or spreading from the main axis; whorled at the lower nodes or not whorled; 4 – 8 on the main axis; 0.4 – 0.5 mm wide. Pedicels 2 – 4 mm long. Cleistogamous inflorescence present. Spikelets 20 – 40 on a typical primary branch; lanceolate to ovate; 2.6 – 3.1(-3.5) mm long; 0.7 – 0.8 mm wide. First glume absent. Second glume 1 times spikelet length; 5 to 7-nerved; hairy; acuminate. Lemma of lower floret 7-nerved; acuminate or acute; usually hairy. Lower lemma hairs shorter than the upper floret; white. Upper floret 0.88 – 1 times the length of the lower floret. Lemma of upper floret grey; acuminate to acute.

*Distribution:* Southern Brazil, Uruguay, and northeastern Argentina.

*Remarks:* *Digitaria lanuginosa* is closely allied to *D. aequiglumis* and occasionally it may be difficult to distinguish between these taxa. Both have cleistogamous inflorescences at the upper leaf nodes. In addition, these taxa possess similar spikelet shapes and the same relative length of the upper floret and lower lemma. The most significant difference between the taxa is that *D. lanuginosa* has short compacted rhizomes and is considered as a perennial, whereas *D. aequiglumis* is morphologically annual. Correlated with this difference is a smaller spikelet size and the presence of more hairs on the leaf blades and spikelet parts in *D. lanuginosa*. When the basal parts of the plant are missing from a specimen it can be difficult to distinguish between these taxa.

Representative specimens: ARGENTINA. Corrientes: General Paz Pueblo Cercanías, 16 Oct 1945, T. S. Ibarrola 3544 (US); Mburucuyá, "Santa María", 28 Nov 1965, R. Rugolo 7509 (NY). Entre Ríos: Isla del Francés (freute a Rosario), 15 Dec 1937, A. Burkart 8860 (F). BRAZIL. Rio Grande do Sul: (precise location unknown), 1902, Malme 1570 (US); Bagé, 11 Apr 1946, J. R. Swallen 9045 (US); Fazenda Experimental de Criciáó Bagé, 2 Dec 1945, J. R. Swallen 7579 (US); Itaqui, Estrada que vai de Itaqui para Alegrete, 25 Nov 1980, R. M. Klein & U. Pastore 11-971 (US); Pelotas, 4 May 1946, J. R. Swallen 9267 (US); Santa Victoria do Palmar, 27 Apr 1946, J. R. Swallen 9232 (US); Uruaguaiana, 9 Dec 1945, J. R. Swallen 7646 (US). URUGUAY. Montevideo: Cauasco, 27 Feb 1937, Rosengurt B-1183 (US). Rocha: Laguna Negra, 20 Mar 1938, Rosengurt B-2615 (US). Salto: rio Uruguay y San Antonio Grande, 27 Feb 1937, Rosengurt B-943; Tacuarembó, Picada del Cuello, 12 Mar 1945, Rosengurt B-4755 (US).

*DIGITARIA LEUCITES* (Trin.) Henr., Meded. Rijks-Herb. 61:6. 1930.  
*Panicum leucites* Trin., Gram. Pan. 85. 1826. — TYPE: Type specimen not located.

*Milium velutinum* DC., Cat. Plant. Horti Bot. Monsp. 126. 1813. *Milium filiforme* Lag., Gen. & Sp. Nov. 2. 1816, non *Digitaria filiformis* (L.) Koeler, 1802. *Syntherisma velutina* (DC.) Chase, Proc. Biol. Soc. Wash. 19:191. 1906. *Digitaria velutina* (DC.) Hitchc., Proc. Biol. Soc. Wash. 40:84. 1927, non *Digitaria velutina* (Forsk.) Beauv., 1812. — TYPE: from cultivated material derived from Mexican seeds (HOLOTYPE: fragment US!).

*Syntherisma velutina glabella* Chase, Contr. U.S. Natl. Herb. 17:220. 1913. *Digitaria leucites* (Trin.) Henr. var. *glabella* (Chase) Henr., Monogr. *Digitaria* 395. 1950. — TYPE: MEXICO, Michoacan, 16 Sep 1910, Hitchcock 6989 (HOLOTYPE: US!; ISOTYPE: LL, NY!).

*Digitaria distans* (Chase) Fern., Rhodora 22:103. 1920. *Syntherisma distans* Chase, Contr. U.S. Natl. Herb. 17:220. 1913. — TYPE: MEXICO, Jalisco, vicinity of Orozco, 29 Sep 1910, Hitchcock 7376 (HOLOTYPE: US!).

*Description:* Plants perennial; stoloniferous; rhizomatous. Nodes glabrous or hairy. Sheath auricles 0.7–1.5 mm long. Sheaths glabrous or hairy (the lower sheaths usually hairy). Ligule 2.3–3.5 mm long. Leaf blades flexuous; spreading; 6–20 cm long; 2–5 mm wide; glabrous or hairy on the lower surface; glabrous or hairy on the upper surface; with the midrib not obviously differentiated. Main axis 15–45 mm long; with quaquaversal primary branches. Primary branches spreading; whorled at the lower nodes or not whorled; 4–9 on the main axis; 0.3–0.4 mm wide. Pedicels 2–4 mm long. Spikelets 20–60 on a typical primary branch; elliptic; 2.4–3.2 mm long; 0.9–1.1 mm wide. First glume present or absent (mostly present as a hyaline truncate scale ca. 0.3 mm long). Second glume 1 times spikelet length; 5-nerved; hairy; acute. Lemma of lower floret (5–) 7-nerved; acute; hairy. Lower lemma hairs subequal to the upper floret; usually purple. Upper floret 0.92–1 times the length of the lower floret. Lemma of upper floret grey or yellow; acute.

*Distribution:* Mexico.

*Remarks:* *Digitaria leucites* is a distinctive perennial species occurring in south-central mountainous regions of Mexico. The most characteristic feature of this species is the relatively plump spikelets in which the second glume and lower lemma do not tightly enclose the upper floret at maturity. The second glume and lower lemma are hairy with purple villose hairs, but frequently the internerve space between the midnerve and first lateral nerve is glabrous. This pattern of pubescence is common in other sections of this genus. *Digitaria distans* is known from two collections (Hitchcock 7376 & 7372), both collected on September 29, 1910 at Orozco, Jalisco, Mexico. Chase (1913) recognized these as a new species and used the distant and glabrous spikelets as key characters. McVaugh (1983) differentiated *D. distans* from *D. leucites* based on the absence of spikelet hairs in *D. distans*. Our study of all the available specimens of these taxa resulted in the following observations. The second glume and lower lemma of *D. distans* is glabrous whereas these structures in *D. leucites* possess a line of mostly purple hairs between the lateral nerves. However, within specimens normally accepted as *D. leucites* there exists a wide range of variation in these characters. For example, *Lyonnet 1879* shows clearly distant nearly glabrous spikelets. It was concluded that *D. distans* is best treated as a synonym.

Representative specimens: MEXICO. Chiapas: Mun. de Zinacantán, 5 Oct 1966, *R. M. Laughlin 2325* (ENCB, TAES). Distrito Federal: Contreras, Primer Dinamo, 14 Jan 1969, *F. García S. 128* (ENCB); Pedregal de Tlalpan, 1932, *E. Lyonnet 975* (MEXU); San Angrés, D. E., Aug 1930, *E. Lyonnet 975* (MEXU); Carretera Cuernavaca, 23 Oct 1937, *E. Lyonnet 1879* (ENCB, CHAPA, MEXU); base of Sierra de Ajusco, 29 Oct 1896, *C. G. Pringle 6623* (ENCB, MEXU); Pedregal de San Angel, cerca de Eslava, 19 Oct 1952, *J. Rzedowski 2008* (ENCB, MEXU). Hidalgo: 10 km al Este de Metepec, 7 Aug 1980, *R. Hernández M. & R. Hernández V. 4716* (MEXU). Jalisco: Los Guaybos, (collection date not given), *A. A. Beetle & R. Guzman M. 5440* (CHAPA); Sierra de Tigre, 3 mi S of Mazamitla, 18 Sep 1952, *R. McVaugh 13029* (MEXU). Mexico: Mun. de Villa Allende, San Cayetano, Oct 1963, *J. M. Alcocer s.n.* (ENCB); Chapingo, Terrenos de la E.N.A., Lomas de San Juan, 1 Oct 1965, *R. Bonilla B. s.n.* (CHAPA); Terrenos de la E.N.A., Xaltepa, 29 Sep 1966, *R. Bonilla B. s.n.* (CHAPA); Chapingo, Mun. de Tezcoco, Molino de las Flores, 19 Oct 1976, *José Cantú s.n.* (CHAPA); Chapingo, Mun. de Tezcoco, 22 Aug 1968, *J. Flores Crespo s.n.* (ENCB); 2 km E of Temamatla, 22 Aug 1972, *J. Elias 203* (ENCB); roadside from San Juan del Río to Mexico City, 6 Nov 1962, *F. W. Gould 10316* (ENCB, TAES); Chapingo, Mun. de Tezcoco, 2.5 km al E de Tezcoco, 14 Oct 1976, *E. García M. s.n.* (CHAPA, TAES, US); Toluca, 13 Sep 1910, *Hitchcock 1560* (LL, NY, TAES); Villa de Allende, 5 Oct 1952, *E. Matuda 26429* (MEXU); Valle de Bravo, 21 Nov 1952, *E. Matuda 27791* (MEXU); Mun. de Ixtapaluca, Cerro del Pino, 30 Oct 1976, *S. Morelos O. 44* (ENCB); Mun. de Ixtapaluca, Ladera Sureste del Cerro del Pino, 3 Oct 1976, *S. Morelos O. 116* (ENCB); Mun. de Huchuetoca, Ladera Suroeste del Cerro del Sincoque, 17 Oct 1976, *A. Ortega R. 209* (ENCB); Mun. de Chalco, 2 km al NE de Miraflores, 22 Nov 1968, *A. Pineda R. s.n.* (CHAPA, ENCB, TAES); Mun. de Ixtapaluca, Cerro del Pino, 3 Oct 1976, *L. Rico R. 51* (ENCB); Mun. de Ixtapaluca, laderas inferiores SE del Cerro del Pino, 3 Oct 1976, *Rzedowski 34423*



(CHAPA, ENCB); Chapingo, Edo. Mexico, (collection date not given), *J. Továr & E. García s.n.* (CHAPA); alrededores de San Pedro Nexapa, 13 Nov 1963, *Marina Villegas D. 276* (ENCB). Michoacán: Mun. Villa Escalante, 24 Oct 1981, *J. García P. 1555* (CHAPA, ENCB); 20 km S Zamora, 28 Sep 1946, *E. Hernández X-2804* (CHAPA); Uruápan, 16 Sep 1910, *Hitchcock 1561* (NY, LL); Uruápan, *Hitchcock 6989* (US); Patzcuaro, 19 Oct 1898, *E. W. D. Holway 3212* (US); Mun. Tāngancicuaro, Las Cañas, 19 Nov 1971, *Rzedowski y McVaugh 612* (ENCB); NE side of the Volcán de Parícutin, 4 Oct 1953, *E. R. Sobus 809* (TAES); NE side of the Volcán de Parícutin, 4 Oct 1953, *E. R. Sobus 822* (TAES). Morelos: 3 mi N of Toll gate, Cuernavaca, 10 Nov 1962, *F. Gould 10388* (TAES, US); 60 km Méx.-Cuernavaca, "Campo Turista," 7 Sep 1952, *F. Gallegos Harkings 499* (MEXU); Trés Marias (Camino de Cuernavaca), Jul 1927, *E. Lyonnet 58* (MEXU); Valle del Tepeite, 17 Sep 1938, *E. Lyonnet 2442* (MEXU). Oaxaca: 42 km de Putla rumbo a Tlaxiaco, 23 Jun 1980, *A. A. Beetle M-4721* (CHAPA); Campamento Río de Molino, 4 km al SW de San Miguel Suchistepec, 21 Sep 1965, *J. Rzedowski 21025* (ENCB); District of Ixtlan, La Cumbre del Cuartel, 2 Nov 1944, *J. V. Santos 3619* (CHAPA, NY). Tlaxcala: Mun. de San Salvador, Tzompantepec, 6 Sep 1982, *H. Vibrans 1187* (ENCB).

*DIGITARIA PAUCIFLORA* Hitchc., Proc. Biol. Soc. Wash. 41:162. 1928. —

TYPE: U.S.A., Florida, Jenkins to Everglade, 10 Nov 1903, *Eaton 207* (HOLOTYPE: US!).

*Description:* Plants perennial; lacking stolons; rhizomatous. Nodes mostly glabrous. Sheath auricles about 1.5 mm long. Sheaths hairy (becoming glabrous with age). Ligule 1.5–2.0 mm long. Leaf blades flexuous or twisted; spreading; 7–18 cm long; 1.0–2.2 mm wide; hairy on the lower and upper surface (becoming glabrous with age); the midrib not obviously differentiated. Main axis 10–80 mm long; with quaquaversal primary branches. Primary branches appressed or spreading from the main axis; not whorled; 2–8 on the main axis; 0.3 mm wide. Pedicels 2–3 mm long. Spikelets 30–60 on a typical primary branch; lanceolate; 2.7–3.0 mm long; 0.7–0.9 mm wide. First glume commonly present. Second glume 1 times spikelet length; mostly 7-nerved; glabrous; acuminate to acute. Lemma of lower floret 7-nerved; acuminate to acute; glabrous. Upper floret 1 times the length of the lower floret. Lemma of upper floret becoming purple; acuminate to acute.

*Distribution:* Southern Florida.

*Remarks:* *Digitaria pauciflora* is known from the Everglades region of southern Florida. Inflorescence and spikelet characteristics are similar to those of *D. simpsonii*. However, they differ significantly on vegetative characters.

Representative specimens: U.S.A. Florida: Dade Co.: Everglades National Park, 6th glade, 19 Jun 1978, *G. N. Avery 1928* (F); Everglades National Park, Long Pine Key, W edge of 3rd glade, Block H, 20 Jun 1978, *G. N. Avery 1929* (F); Everglades National Park, Long Pine Key, Block D, 16 Jun 1978, *G. N. Avery 1932* (F); Everglades National Park, S of Long Pine Key Road in 6th glade, 20 Oct 1978, *G. N. Avery 1979* (F); Jenkin's Home-

stead, 14–20 mi S of Cutler, (collection date unknown), *A. A. Eaton s.n.* (F US); Everglades National Park, Long Pine Key, Glade #6, 28 Apr 1986, *A. Herndon 1519* (F); In pinelands, South Miami, 2 Oct 1939, *W. A. Silveus 5285* (TAES); between Cutler and Longview Camp, 9 Nov 1903, *J. K. Small & J. J. Carter 916* (NY).

*DIGITARIA SABULICOLA* *Henr., Blumea* 1:108: 1934. — TYPE: BRAZIL, Provincia de Espirito Santo, 1816–1821, (HOLOTYPE: P; ISOTYPE US!).

*Description:* Plants perennial; lacking stolons; rhizomatous. Nodes glabrous. Sheath auricles about 0.6 mm long. Sheaths glabrous. Ligule 1–2 mm long. Leaf blades flexuous; spreading; 2–5 cm long; 1.5–2.5 mm wide; glabrous or hairy on the lower surface; hairy on the upper surface; with the midrib obviously differentiated. Main axis 10–25 mm long; with quaquaversal primary branches. Primary branches appressed to the main axis; whorled at the lower nodes or not whorled; 3–9 on the main axis; 0.2 mm wide. Pedicels 1.5–2.5 mm long. Spikelets 32–70 on a typical primary branch; lanceolate; 2.1–2.3 mm long; 0.4–0.5 mm wide. First glume absent. Second glume 1 times spikelet length; 5-nerved; hairy; acuminate. Lemma of lower floret 7-nerved; acuminate; hairy. Lower lemma hairs shorter than the upper floret; white. Upper floret 0.9 times the length of the lower floret. Lemma of upper floret yellow; acuminate.

*Distribution:* Brazil.

*Remarks:* The present concept of *D. sabulicola* is based on two collections from Brazil. Further collections are needed to better understand the full range of morphological variation for this species and its affinities within the section. The principle diagnostic character is spikelet length which is shorter than that found in the apparently closely related taxa, which include *D. aequiglumis*, *D. cuyabensis*, and *D. lanuginosa*.

Representative specimens: Brazil. Bahia: Joazeiro, near Rio Sao Francisco, 13 Dec 1924, *Chase 7910* (US). Espirito Santo: Santo, Voyage d'Auguste de Saint Hilare, from 1816–1821 (precise location and collection date not given) (US).

*DIGITARIA SIMPSONII* (Vasey) Fern., *Rhodora* 22:103. 1920. *Panicum sanguinale* var. *simpsonii* Vasey, *Contr. U.S. Natl. Herb.* 3:25. 1892. *Panicum simpsonii* (Vasey) Beal, *Grasses of N.A.* 109. 1896. *Syntherisma simpsonii* (Vasey) Nash, *Bull. Torrey Bot. Club* 25:297. 1898. — TYPE: U.S.A., Florida, Manatee, 1890, *J.H. Simpson* (HOLOTYPE: NY!; ISOTYPE: US!).

*Description:* Plants perennial; lacking stolons; rhizomatous. Nodes mostly glabrous. Sheath auricles 0.7–1.5 mm long. Sheaths hairy (becoming glabrous with age). Ligule 1.5–2.5 mm long. Leaf blades flexuous; spreading; 6–20 cm long; 3–55 mm wide; hairy on the lower surface; hairy on the upper surface (becoming glabrous with age); with the midrib

not obviously differentiated. Main axis 40–70 mm long; with quaquaversal primary branches. Primary branches spreading from the main axis; not whorled; 6–9 on the main axis; 0.3 mm wide. Pedicels 1.5–2 mm long. Spikelets 40–50 on a typical primary branch; ovate to lanceolate; 2.9–3.1 mm long; 0.7–0.9 mm wide. First glume typically absent. Second glume 1 times spikelet length; mostly 7-nerved; glabrous; acuminate to acute. Lemma of lower floret 7-nerved; acuminate to acute; glabrous. Upper floret 1 times the length of the lower floret. Lemma of upper floret becoming purple; acuminate to acute.

*Distribution:* Florida.

*Remarks:* According to Nash (1898) the type material for *D. simpsonii* was taken from cultivated material originally collected from Long Key southwest of Sarasota Bay, Florida. The length of time that the plants were in cultivation before the type material was collected is unknown. The name has been applied to two collections from Florida and material from Cuba. The Cuban collections are *D. ekmanii*. The two collections from Florida are the holotype from Manatee, Florida and *Curtiss 6422* from St. Augustine, Florida. Spikelet and vegetative characters differ between these collections and it is obvious that they belong to different species. *Curtiss 6422* is a perennial with a decumbent base, the leaves are hairy with pilose or setaceous indumentum, and the spikelets are about 2.5 mm long and glabrous or with a few short purple hairs between the lateral nerves. All characteristics found in *Curtiss 6422* are also found in *D. texana*. Specific examples of *D. texana* that possess characteristics of *Curtiss 6422* include *Swallen 1533*, *H. R. Reed s.n.*, and *Swallen 10574*. It was concluded that *Curtiss 6422* is a disjunct collection of *D. texana*. Therefore, this species is only known from the type material and its present status under natural conditions is unknown.

Representative specimens: U.S.A. Florida: Manatee, garden of J. H. Simpson, 1890, *Simpson s.n.* (NY, US).

*DIGITARIA TEXANA* Hitchc., Proc. Biol. Soc. Wash. 41:162. 1928. — TYPE: U.S.A., Texas, 6–27–1910, *Hitchcock 5479* (HOLOTYPE: US!).

*Digitaria ranyonii* Hitchc., J. Wash. Acad. Sci. 23:455. 1933. — TYPE: U.S.A., Texas, 21 Apr 1929, *Ranyon 188* (HOLOTYPE: US!).

*Digitaria subcalva* Hitchc., Amer. J. Bot. 21:138. 1934, *syn. nov.* — TYPE: U.S.A., Florida, Plant City, 26 Oct 1932, *C.P. Wright 1556* (HOLOTYPE: US!; ISOTYPE: MO!).

*Digitaria albicoma* Swallen, J. Wash. Acad. Sci. 30:214. 1940, *syn. nov.* — TYPE: U.S.A., Florida, 18 Nov 1938, *Swallen 5644* (HOLOTYPE: US!).

*Description:* Plants perennial; stoloniferous; rhizomatous. Nodes glabrous. Sheath auricles 0.5–1.5 mm long. Sheaths glabrous or hairy. Ligule 1–2 mm long. Leaf blades flexuous; spreading; 2.5–20 cm long; 2–6 mm wide; glabrous or hairy on the lower surface; glabrous or hairy on the upper surface; with the midrib obviously differentiated. Main axis 10–70 mm long; with quaquaversal primary branches. Primary branches spreading; whorled at the lower nodes or not whorled; 5–12 on the main axis; 0.31–0.4 mm wide. Pedicels 1–2.5 mm long. Spikelets 18–65 on a typical primary branch; lanceolate to ovate; 2.3–3(–3.2) mm long; 0.51–0.7 mm wide. First glume absent (occ. present as a small hyaline scale). Second glume (0.9–)1 times spikelet length; (3–)5-nerved; glabrous or hairy; acuminate to acute. Lemma of lower floret 7-nerved; acuminate to acute; glabrous or hairy. Lower lemma hairs shorter than the upper floret; white. Upper floret 0.95–1 times the length of the lower floret. Lemma of upper floret yellow or purple; acuminate to acute.

*Distribution:* Texas and occ. introduced in Florida and Mesoamerica.

*Remarks:* The *Digitaria texana* - *runyonii* complex occurs on sandy coastal areas of southern Texas from Calhoun to Cameron County. One collection reported from Brazos Co., Texas [Reeves 1040 (TAES)] probably represents an incorrectly labeled specimen. There is one collection from Veracruz, Mexico [Hitchcock 6554 (LL, NY, US)], and future collections may show that this complex commonly occurs on sandy coastal areas in Tamaulipas. Hitchcock (1950) and Gould (1975) distinguished *D. texana* from *D. runyonii* on spikelet length and vestiture of second glume and lower lemma; however, Correll and Johnston (1970) united these species.

Our study of this complex indicated an interesting correlation between the morphological forms and habitat. These taxa are commonly associated with coastal sand dunes but extend inland for about 75 miles. The inland form has spikelets usually 2.3–2.6 mm long with the second glume and lower lemma glabrous to sparsely hairy. Examples of this form include *H. R. Reed s.n.* (US), *Swallen 1533* (US), *Cory 28346* (TAES), *Runyon 2783* (NY), and *W. A. Silveus 7310* (TAES, US). This small-spikelet form occurs on the coast but differs in that the second glume and lower lemma is distinctly hairy with villous hairs between the lateral nerves. A number of specimens, including the holotype of *D. texana*, are intermediate between these forms. The other morphological form identified in this complex occurs in coastal sandy areas. Vegetative characteristics overlap with the inland form; however, the spikelets are about 2.8–3.2 mm long and the outer bracts distinctly hairy. The holotype of *D. runyonii* falls into this group. Intermediates [*Landell 15029* (NY), *Swallen 10563* (US), and *Swallen 10611* (US)] are common between the small and large spikelet

forms. Based on these observations it was concluded that *D. runyonii* is best placed in synonymy under *D. texana*.

*Digitaria albicoma* is known from two collections, the holotype (collected in 1938) and a second incomplete specimen collected five years later at the same locality (Chinsegut Hill Sanctuary, Brooksville, Florida). These specimens possess the following significant characteristics: perennial with densely villose leaf sheaths; leaf blades long, narrow, with a pronounced mid-nerve; primary inflorescence branches lacking spikelets at the base; spikelets ca. 2.6 mm long, nearly glabrous but with a few purple hairs in the internerve spaces. These characters can be found in the range of variation accepted in *D. texana*. Some specific examples of *D. texana* exhibiting these characters are *Swallen 1856, 1533, & 1408 - A*, all of which occur on sandy coastal areas. It was concluded that *D. albicoma* is best treated as a synonym of *D. texana*. A similar situation exists for *D. subcalva*, which is also treated as a synonym. The presence of these specimens in Florida indicates that *D. texana* is occasionally introduced but fails to persist. It is interesting to note that these specimens were collected close to the 28th latitude, which is the same latitude where *D. texana* is native and concentrated in the Texas coastal Bend region.

Representative specimens: MEXICO. Veracruz: Veracruz, 31 Aug 1910, *A. S. Hitchcock 6554* (LL, NY, US). U.S.A. TEXAS: Aransas Co.: Aransas near Bay, 24 Nov 1932, *W. A. Silvens 847* (US); Port Aransas Pass, 24 Nov 1940, *W. A. Silvens 6790* (TAES); Rockport, 15 Oct 1941, *W. A. Silvens 7320* (TAES); Port Aransas, 10 Nov 1941, *W. A. Silvens 7450* (TAES); Copano Bay, E side, 25 Nov 1931, *B. C. Tharp 7908* (US, NY). Brazos Co. (?): Fall 1940, *R. G. Reeres 1040* (TAES). Brooks Co.: 4 mi SE of Encino Division, King Ranch, 18 Nov 1954, *F. W. Gould & J. Morrow 6728* (TAES); Falfurrias, 26 Jun 1936, *H. R. Reed s.n.* (US); Santa Fe Division, King Ranch, 3 Nov 1949, *J. R. Swallen 10597* (US). Calhoun Co.: sand below Seadrift, 1 Dec 1928, *Tharp 5073* (US). Cameron Co.: mouth of Rio Grande, 21 Apr 1929, *R. Runyon 188* (US); Brazos Santiago Island, 25 Sep 1938, *R. Runyon 1878* (US); Brazos Santiago Island, 7 Oct 1938, *R. Runyon 2010* (F). Kenedy Co.: Sarita, 27 Jun 1910, *A. S. Hitchcock 5479* (US); Kings Ranch, 8 mi S of Sarita, 15 Oct 1946, *Lundell & Lundell 14701* (US); Kenedy Ranch, N of Mifflin, 3 Nov 1949, *C. L. Lundell 15029* (NY); between the South border and Los Norias, 11 May 1941, *R. Runyon 2783* (NY); near Encino, 30 Apr 1932, *W. A. Silvens 575* (US); Sarita, 14 Nov 1941, *W. A. Silvens 7311* (TAES, US); Sarita, 6 Apr 1931, *J. R. Swallen 1408 - A* (US); Sarita, 17 Apr 1931, *J. R. Swallen 1513* (US); Sarita, 17 Apr 1931, *J. R. Swallen 1533* (US); Riviera to Riviera beach, 8 Jun 1931, *J. R. Swallen 1856* (US); King Ranch, Norias Div., San Jose pasture, 2 Nov 1949, *J. R. Swallen 10574* (US); King Ranch, Norias Div., San Jose pasture, 2 Nov 1949, *J. R. Swallen 10579* (US); between Mifflin and Armstrong, 2 Nov 1949, *J. R. Swallen 10581* (TAES); 1½ mi S of Mifflin, 2 Nov 1949, *J. R. Swallen 10591* (US); N of Mifflin, 3 Nov 1949, *J. R. Swallen 10610* (US); N of Mifflin, 3 Nov 1949, *J. R. Swallen 10611* (US). Kleberg Co.: Padre Island, 25 Nov 1932, *W. A. Silvens 848* (NY, US); King Ranch, Lourellis Div., 1 Nov 1949, *J. R. Swallen 10563* (US); 3.1 mi S of Riviera, 8 Oct 1935, *H. D. Parks & V. L. Cory 16989* (TAES). Nueces Co.: Mustang Island, 29 Nov 1940, *B. H. Warnock 20936* (TAES, US); 15 mi S of Corpus Christi, 1 Oct 1931, *W. A. Silvens 356* (US);

Mustang Island, 18 Oct 1975, S. R. Hill 3843 (TAES); 10 mi S of Corpus Christi, 6 Jun 1931, J. R. Swallen 1829 1/2 (US). Refugio Co.: Copano Bay, 26 Feb 1932, B. C. Tharp 43189 (NY). Willacy Co.: Raymondville, 4 Apr 1938, V. L. Cory 28346 (TAES); 15 mi N of Raymondville, 14 Nov 1941, W. A. Silveus 7305 (TAES); between Laguna Madre and Raymondville, 14 Nov 1941, W. A. Silveus 7310 (TAES, US).

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